MINUTES OF THE
PROFICIENCY TESTING COMMITTEE MEETING
JULY 10, 2002

The Proficiency Testing Committee of the National Environmental Laboratory Accreditation Conference (NELAC) met on Wednesday, July 10, 2002, at 1:30 p.m., Eastern Daylight Time (EDT) as part of the Eighth Annual NELAC Meeting in Tampa, Florida. The meeting was led by Chairperson Barbara Burmeister of the Wisconsin State Laboratory of Hygiene. A list of action items is given in Attachment A. A list of participants is given in Attachment B. *The purpose of the meeting was to address items of importance identified in the meeting agenda.*

WELCOME AND INTRODUCTION

Ms. Burmeister introduced herself as the Chairperson of the Proficiency Testing Committee and welcomed the participants. The Committee members then introduced themselves.

CHAPTER 2 SUMMARY

MaryKay Steinman reported that the Committee received many comments regarding Chapter 2. Therefore, the Committee has generated the proposed changes to Chapter 2.

PROPOSED CHANGES TO CHAPTER 2

Ms. Burmeister reported that the Committee is proposing that all references to analyte groups be deleted from section 2.1.3, Appendix C. The Committee solicited the accrediting authorities, laboratories and proficiency test providers to ascertain the advantages/disadvantages of analyte groups. The majority felt that having to track through analyte groups caused additional unnecessary work. She also reported the results of discussion at NELAC 7i that an overwhelming number of participants agreed that analyte groups should be deleted from all references in section 2.1.3, Appendix C. Discussion ensued and many comments were presented for and against the deletion of analyte groups. A conclusion was reached to continue with the proposed changes to delete all references concerning analyte groups in 2.1.3, Appendix C.

Sections 2.3 and 2.5

The Committee received a question regarding specific language in the NELAC Standards concerning requirements that laboratories have to follow, but no language addressing requirements proficiency test providers have to follow. The Committee is proposing to add language to section 2.3 regarding requirements for proficiency test providers. All participants were in agreement with this addition to section 2.3 of the Standards.

Accrediting authorities have requested that the Committee strengthen the criteria in section 2.5 concerning requirements for proficiency test study samples. The accrediting authority felt that when proficiency testing came into effect, it was not handled as close to a routine sample as possible, especially when it came to the type of quality control that was used. The Committee therefore, has proposed language to be added to section 2.5, with a few small revisions to the changes as a result of a previous meeting. The phrase *as acceptable laboratory practice* was stricken from the proposed language and the word *should* has been changed to *shall*.

"QUICK RESPONSE" AND CORRECTIVE ACTION WORKING GROUP REPORT AND PROPOSED CHANGES TO SECTION 2.7.3.1

Anand Mudambi gave a presentation concerning the proposed changes to section 2.7.3.1. This presentation can be viewed in Attachment C. There were concerns raised by accrediting authorities, regarding the proposed changes, that the laboratories wish to know the results of previously released proficiency test samples. The accrediting authorities felt that, if the laboratory took part in the proficiency test study, they should have access to the results. As a result of this issue there has been proposed language added to the last paragraph in section 2.6. Discussion ensued and comments were raised regarding the proposed language in sections 2.6 and 2.7.3.1c. Therefore, it was decided to make revisions to these sections, which will read:

> 2.6 - *If the report is available in electronic format, it shall be available only to the designated laboratory representatives who participated in the PT study and the primary accrediting authority.*
>
> 2.7.3.1c - *The PT provider cannot supply the laboratory with a sample that has been previously sent to the laboratory.*

TECHNOLOGY, METHOD AND ANALYTE CODES UPDATE

Ralph Obenauf presented an update concerning technology, method, and analyte codes and changes being made to these codes. His presentation may be observed in Attachment I. He commented on a searchable database on the Internet, created by Absolute. Lance Boynton of Absolute Standards reported that the link could be found at "64.204.17.83.methodsearch".

Mr. Obenauf reported that the SOP for handling these codes is straightforward. Anyone can submit additional modifications to the codes. He invited everyone to take a look at the code lists that appear on the website already. The Committee encouraged comments concerning problems and that any comments presented be submitted in writing. The Committee also asked that submissions have background information and data supporting the comment. The ultimate goal is to have everyone using a standardized set of codes.

Tom McAninch presented a report concerning technology codes, the handout can be found in Attachment F and the finalized version is on the NELAC website.

RADIOCHEMISTRY SUBCOMMITTEE REPORT AND PROPOSED CHANGES TO APPENDIX G

John Griggs, member of the Radiochemistry Subcommittee, reported changes they have proposed to appendix G.3. The Subcommittee felt that the language in this section was not clear and have proposed replacement language. All participants were in agreement with this change to section G.3 of the Standards. Mr. Griggs also reported that the Subcommittee would be discussing acceptance criteria for other matrices in future teleconferences.

UNIFORM ELECTRONIC PT DATA FORMAT FOR ACCREDITING AUTHORITIES

Dr. Mudambi presented the report concerning uniform electronic proficiency test data format, which can be observed in Attachment D. If anyone feels that this information needs revisions he/she can provide feedback by email. The ultimate goal is to have standardization in terms of the analyte methods and technology codes. The Committee desires input from accrediting authorities and proficiency test providers to produce well-rounded conclusions.

FIELD OF PROFICIENCY TESTING ACCEPTANCE CRITERIA SUBCOMMITTEE REPORT AND DISCUSSION

Ms. Burmeister presented the report concerning the evaluation of acceptance criteria. Her full presentation may be observed in Attachment E. The Proficiency Testing Committee obtained evaluations from proficiency test providers, accrediting authorities and laboratories concerning problematic substance criteria. The data was evaluated and the Acceptance Criteria Subcommittee was formed to review the data and make recommendations to the Proficiency Testing Committee. The Subcommittee consists of four proficiency test providers, three accrediting authorities, an EPA Office of Water representative, and a statistician; of which the ultimate goal is to ensure a better program to improve data quality.

Evaluation of acceptance criteria by preparation method

Larry Jackson presented a report concerning acceptance criteria by preparation method, which can be observed in Attachment F. The objective of the Proficiency Testing Committee is to support the NELAC mission to provide documented technically defensive environmental data. Preparation methods are working to create a basic structure for everyone to follow.

ONGOING PT PROVIDER MONITORING CRITERIA SUBCOMMITTEE REPORT AND DISCUSSION

Mr. Obenauf presented a report concerning ongoing monitoring criteria for proficiency test providers, which may be observed in Attachment G. This report covers the scope of the ongoing monitoring criteria and presents criteria lists.

OTHER ITEMS OR ISSUES

Carl Kircher presented a report concerning evaluation of the PTOB/PTBA organizations, which may be observed in Attachment H. He also reported on recommendations for the Proficiency Testing Committee, which can also be found in his presentation.

Ms. Burmeister gave a report concerning the NIST meeting she attended on Monday. NIST is currently reevaluating whether or not they are going to stay in the proficiency testing accreditation business. Their agreement with the EPA has expired and there are no additional funds for them to continue in the program. They are soliciting the proficiency test providers, accrediting authorities, and the laboratory communities regarding whether or not they should continue with the program.

Ms. Burmeister announced that RaeAnn Haynes would be the new Chairperson of the Proficiency Testing Committee as Ms. Burmeister is rotating off. Sharon Dahl of the Minnesota Department of Health will be the new voting member and Dr. Jim Pletl of the Hampton Roads Sanitation District (HRSD) in Virginia will be the new contributing member.

ADJOURNMENT

There being no further business to discuss, the meeting was adjourned.

ATTACHMENT A

ACTION ITEMS
PROFICIENCY TESTING COMMITTEE MEETING
JULY 10, 2002

Item No.	Date Proposed	Action	Date to be Completed
1.	7/10/02	Work with the EPA to revise Criteria Document.	OPEN
2.	7/10/02	Find a mechanism to develop a proficiency testing database for monitoring proficiency test study data.	OPEN
3.	7/10/02	Expand proficiency testing program to include additional analytes and matrices.	OPEN
4.	7/10/02	Work with NELAP Accrediting Authority Subcommittee to designate additional PTOB/PTPAs.	OPEN
5.	7/10/02	Radiochemistry Subcommittee to discuss acceptance criteria for other matrices.	OPEN
6.	7/10/02	Produce standardized analyte and technology codes.	OPEN
7.	7/10/02	Preparation methods are working to create a basic structure of acceptance criteria for everyone to follow.	OPEN

ATTACHMENT B

LIST OF PARTICIPANTS
PROFICIENCY TESTING COMMITTEE MEETING
JULY 10, 2002

Name	Affiliation	Address
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Larry Jackson	Environmental Quality Management	T: (603) 924-6852 F: (603) 924-6346 E: lpjackson@msn.com
Tom McAninch	Eastman Chemical Company	T: (903) 237-5473 F: (903) 237-6395 E: twmcan@eastman.com
Michael Miller (Absent)	NJ DEP - Lab Certification Office of QA	T: (609) 633-2804 F: (609) 777-1774 E: mmiller1@dep.state.nj.us
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Marykay Steinman (Absent)	M.J. Reider Associates, Inc.	T: (610) 374-5129 F: (610) 374-7234 E: msteinman@mjreider.com
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NELAC 8

Proficiency Testing

Wednesday, July 10, 2002

"Quick Response"/Corrective Action Working Group Report and proposed changes to Section 2.7.3.1 - Supplemental PT Studies for Demonstrating Corrective Action

1. Background:

Some concerns were raised by the US EPA Office of Water to the PT Committee regarding use of previously released NELAC compliant PT samples for demonstrating corrective action. The "Quick Response"/Corrective Action Working Group of the Proficiency Testing (PT) Committee worked with the US EPA Office of Water, laboratories, Accrediting Authorities (AAs), and PT providers to address these concerns. Based on their input, the PT committee proposes the following changes to
Section 2.7.3.1.

2. Main Concerns and Proposed Changes:

a. Stability of Previously Released PT Samples. Section 2.7.3.1b has added a sentence at the end, which states the PT Studies may be used "so long as they are within the stability period (e.g., expiration date) for that sample.

b. Analytical values of previously released PT samples will be known to the laboratories especially if they are part of a network. Section 2.7.3.1c has been revised to address this issue by adding language stating that the laboratory must provide network information to the PT provider.

c. Use of Supplemental PT Studies for Demonstrating Corrective Action by Accrediting Authorities (AA). This concern has been addressed by a FAQ on the NELAC website.

FAQ: How are Supplemental PT Studies for Demonstrating Corrective Action Used by Accrediting Authorities?

Answer: The Accrediting Authorities (AA) have the final authority in accepting or rejecting results from a Supplemental PT Study used for demonstrating corrective action. This is especially true if the laboratory has failed two consecutive PT studies for an analyte. The laboratory must contact their AA to resolve the situation.

1. The "Quick Response"/Corrective Action Working Group would like to thank all stakeholders for their input regarding the proposed changes to Section 2.7.3.1.

NELAC 8

Proficiency Testing

Wednesday, July 10, 2002

Uniform Electronic PT Data Format for Accrediting Authorities

1. Standard electronic format for reporting PT data

a. NELAC section 2.6 details PT report content.

Need to determine if information needs to be revised.

b. The NELAC Analyte, Method, and Technology Codes are available at the EPA/NELAC web site. PT providers are committed to begin using the codes within 6 months. The AAs need to establish reference Tables for their specific systems.

c. Format: Standard ASC II, tab-delimited files, other formats?

Do fixed field sizes need to be recommended?
Survey PT providers and AAs

2. Proposed Format for electronic delivery of PT results to AAs and Laboratories – SEDD (Superfund Electronic Data Deliverable) which is a non Agency or Program specific format.

a. Advantages:

i. Electronic data is transmitted as an XML (Extensible Markup Language) Document.

ii. Structures and Data Element Dictionary already available for consistent format and tagging of data.

iii. Variety of parsers available for viewing, editing, or programmatically processing these files to interface with different databases.

iv. Style sheets can be used to generate different types of hardcopies based on the same electronic data.

b. Status: Pilot studies are in progress with offices from various agencies (EPA, US Army Corps of Engineers, US Navy).

c. For more information about SEDD, please check out the following web page:

www.epa.gov/superfund/programs/clp/sedd.htm

Evaluation of NELAC Fields of Proficiency Testing Acceptance Criteria

NELAC PT Committee
NELAC 8
July 10, 2002

"Problematic" Analyte Criteria

- Identification of analytes with:
  - Failure rates >20%
  - Failure rates <1%
  - Other "problematic" PT analytes noting reason for concern
- Data substantiating the reason

PT Provider Perspective

Analytes w/consistent >20% FR (3 PT Providers)

	FR 00-01	EPA 95-99
• WS Orthophosphate	28%	22%
• WS Calcium Hardness	22%	16%
• WS Cyanide	21%	19%
• WS Boron	25%	17%
• WS Manganese	20%	18%
• WS Mercury	28%	13%

Analytes w/consistent >20% FR (3 PT Providers)

	FR 00-01	EPA 95-99
• WP Fluoride	20%	16%
• WP Aluminum	21%	10%
• WP Molybdenum	21%	17%

Accrediting Authority Perspective

Acceptance criteria too tight

- WS pH

High concentration limit too high

- WS Residual free chlorine

Acceptance criteria produce limits that do not include the assigned value

- WP BOD
- WP Total Suspended Solids

0% Failure Rate

- WP pH

Laboratory Perspective

Analytes with acceptance criteria more stringent than calibration verification requirements

- WS Calcium
- WS Chloride
- WS Manganese
- WS Vanadium
- WS Orthophosphate
- WS Method 524.2 VOCs

Acceptance criteria produce limits that do not include the assigned value

- WP BOD
- WS Alkalinity

Low concentration limit is below the reporting limit

- RCRA Anthracene
- RCRA Fluorene
- RCRA 2,4-Dimethylphenol

Acceptance Criteria Evaluation

- Identify problematic acceptance criteria
- Recalculate all acceptance criteria including data from 2000-2001
- Request 2000-2001 study data from all NIST PT Providers
- Evaluate pass/fail rates and revise acceptance criteria accordingly
- Data was requested from PT Providers in December 2001
- Data was received from six PT Providers
- Data was masked and initially evaluated
- Subcommittee was formed to review data and make recommendations to NELAC PT Committee

Subcommittee membership

- Four PT providers
- Three accrediting authorities
- EPA OW representative
- Statistician
- Subcommittee developed process to refine data sets
  - R^2 value must be ≥ 0.9 for mean
  - R^2 value must be ≥ 0.75 for SD
  - Must include 90% of data sets
- Recalculated acceptance criteria for "problematic" analytes identified at NELAC 7i

Initial data review demonstrated an increase in failure rates:

- New labs not used to PT analysis
- Multiple PT provider system
- Unfair comparison to historical EPA failure rates
- Historical EPA Failure Rates
  - Data used to calculate acceptance criteria was from EPA, state and reference labs only
  - Failure rates based on these studies and not studies using Criteria Document regression equations
  - Comparing apples to oranges
- Concerns
  - There is no current data available to show failure rates of the multiple provider system
  - Revising acceptance criteria will weaken the PT program (EPA and AAs)
  - Unable to revise acceptance criteria of WS analytes (federally promulgated in 40 CFR Part 141)
- Planned process
  - Make initial change to acceptance limits if possible
  - Look very closely at data over next two years
  - Move to robust statistical calculations if $N \geq 20$
- Goal
  - A better program to improve data quality

PT Acceptance Limits:

Are We Looking at the Right Thing????

Objective of the NELAC PT Program

- To support the NELAC mission to provide technically defensible and documented environmental data

Question ??

- Should the PT program challenge the ability of the laboratory to produce technically defensible data at the concentration levels of regulatory importance??

Answer

No

- Then let's discontinue the program because it creates no value added for the NELAC Program.

Answer

Yes

- Then the current approach should be revisited because we are not always looking at the right thing.

    - *At least in the RCRA FOT*

What Should We Be Looking At?

Answer

- The ability of the laboratory to produce technically defensible data at the regulatory decision points

    – The current design of the RCRA FOT PT samples does not do that.

    - *DO the SDWA and CWA FOT designs accomplish that?*

Important RCRA Regulatory Levels

- Regulatory decision levels in the RCRA program are based on two decisions that must be made.

    – *Is the waste hazardous?*

    – *Do the treated hazardous wastes meet the Land Disposal Restriction requirements?*

What are the Levels

Is the waste hazardous?

- Concentration in the raw waste, or
- Concentration in the TCLP leachate
  - *40 CFR Part 264*

Does the treated waste meet LDR limits?

- Concentration in the TCLP leachate;
  - *40 CFR Part 268*

RCRA Limits

40 CFR Part	Cd	Cr	Pb
264, TCLP Leachate, mg/L	1	5	5
264, Raw Waste, mg/kg	20	100	100
268, TCLP Leachate, mg/L	0.11	0.60	0.75

RCRA Limits vs. FOT Concentration Range

Cd		Cr		Pb	
1	None 0.008 – 0.750 0.002 – 0.050	5	None 0.017 – 1.00 0.010 – 0.10	5	None 0.070 – 3.00 0.005 – 0.100
20	40 – 300 NA NA	100	40 – 300 NA NA	100	50 – 250 NA NA
0.11	None 0.008 – 0.750 0.002 – 0.050	0.60	None 0.017 – 1.00 0.010 - 0.10	0.75	None 0.070 – 3.00 0.005 – 0.100

RCRA Limits vs. FOT Concentration Range

CdCd		CrCr		PbPb	
11	None 0.008 – 0.750 0.002 – 0.050	55	None 0.017 – 1.00 0.010 – 0.100	55	None 0.070 – 3.00 0.005 – 0.100
20	40 - 300 NA NA	100	40 – 300 NA NA	100	50 – 250 NA NA
0.11	None 0.008 – 0.750 0.002 – 0.050	0.60	None 0.017 –1.00 0.010 – 0.10	0.75	None 0.070 – 3.00 0.005 – 0.100

Conclusion

- NOW
  - We need to take the regulatory decision levels into account when designing the PT sample requirements.
- Future (*but very soon)*
  - After we get the levels right, we have to determine if the acceptance criteria support technically defensible data.

NELAC 8 July 10, 2002
PT Session

Ongoing Monitoring Criteria

Scope as per NELAC Appendix D.4

- PTOB/PTPA shall conduct ongoing oversight of all approved PT providers
  1. Referee labs to verify randomly selected samples
  2. Statistical monitoring of PT provider's study data. Ongoing monitoring criteria to be used by a PTOB/PTPA shall be developed by NELAC
  3. Biennial on-site inspections

Ongoing Monitoring Criteria Lists

- Committee developed three lists
- Criteria for ongoing oversight
- Criteria for biennial on-site inspections
  - Better monitored on-sight
- Criteria for ongoing oversight but on the side for now
  - Need further study

Criteria For Ongoing Oversight

1. Correct and complete analyte lists as per PTP NELAC scope of Accreditation
2. Demonstration of random concentrations distributed throughout the specified analyte range
3. Required minimum number of analytes included in groups such as volatiles, semivolatiles, herbicides, etc.
4. Documentation for any change in the initial assigned value during a study

Ongoing Oversight Criteria Cont.

5. Correct calculation of assigned values (prior to study), acceptance limits and warning limits as appropriate per analyte
6. Homogeneity testing(prior to study)
7. Verification of prepared/assigned value
8. Stability testing
9. Pass/Fail rate consistencies
10. Complaints and responses to complaints
11. Compliance with NELAC nomenclature (codes) for methods, analytes, tech.

Criteria for biennial on-site inspections

1. Uniform pass/fail criteria
2. Study lengths, start/stop dates
3. Timeliness of reports to customers, to NIST/NVLAP
4. Report formats as required, notify PTOB if changed
5. Instructions
6. Sales and marketing literature advertisements, etc.
7. Interpretations provided as educational material for participants (appropriateness as to even playing field)

Criteria Needing Further Study

1. Consistency of method-specific summary statistics (multi-modal distributions)
2. Number of participants (change can be due to many reasons)

Evaluating PTOB/PTPA Organizations: Progress-to-Date

Dr. Michael Miller, NJ-DEP
Fred Choske, CA-DOHS
Dr. Carl Kircher, FL-DOH

Background Timeline

- NELAC VIIi - Dissatisfaction with (lack of) PT Provider oversight
- AA Workgroup forms subcommittee to address PTOB/PTPA issues (Jan-Feb, 2002)
- Quality System formulated to evaluate organizations seeking to become PTOB/PTPA's (March-May, 2002)

Evaluation Criteria for PTOB/PTPA Organizations

- Organization complies with NELAC Standards in Appendix D to Chapter 2
- Organization assesses PT Providers for compliance with NELAC Chapter 2 and Appendices A, B, C, E, F, G, & H

Organizations Evaluated to Become PTOB/PTPA's

- National Voluntary Laboratory Accreditation Program (NIST/NVLAP)
- American Association for Laboratory Accreditation (A2LA)

Findings for NIST/NVLAP Evaluation

- PT Provider's quality system evaluated to ISO 17025 requirements
- PT Provider assessed to requirements in EPA "Criteria Document," and in NIST Handbooks 150 and 150-19
- NELAC Standards not addressed unless part of the EPA "Criteria Document"

Findings for A2LA Evaluation

- Observations incomplete - Management questions need to be addressed at A2LA headquarters by senior mgmt.
- PT Provider quality system evaluated against ISO 17025, 9001, & Guide 34 requirements
- Technical operation assessed against NELAC Standards in Chapters 2 & 5 and ISO Guide 43

Probable Outcomes

- NIST/NVLAP could potentially meet NELAC requirements for a PTOB/PTPA
- NIST/NVLAP has no commitment to become a NELAP PTOB/PTPA at this time
- NIST/NVLAP oversight confined to EPA "Criteria Document" standards for WS, WP, & DMR-QA Fields of Proficiency Testing only
- A2LA most work to become a PTOB/PTPA
- Fields of Proficiency Testing oversight will include Fields of Proficiency Testing in Microbiology, Chemistry (including RCRA soils), Radiochemistry, Toxicity, & Air Testing
- Final report will be delivered to NELAP AA workgroup

Questions to be Answered at NELAC VIII

- Is oversight of NELAP PT Providers necessary?
- Is the PT oversight program established from the WS & WP externalization sufficient?

NELAC Standards in Chapter 2, Appendix D & elsewhere were assessed for the first time

Recommendations for the NELAC PT Committee

- NELAC should not require the PTPA to maintain a PT Provider database (should revise Appendix D.5 to make this NELAP's responsibility)
- NELAC PT Tables must be updated to include acceptance criteria & concentration ranges reflective of the new structure for Fields of Proficiency Testing (matrix - method/technology - analyte)

Recommendations for the NELAC PT Committee

- Facilities supporting PT Providers are not necessarily Env. Testing Labs.; thus, assessment to ISO 17025 is sufficient (should delete reference to "NELAC Ch. 5" in Appendix A.2 to NELAC Chapter 2)
- Assigned values are not always used to establish acceptance criteria (need to revise App. B.2 to NELAC Ch. 2 since PT study means sometimes used to set such criteria)

Recommendations for the NELAC PT Committee

- PTPA should not be responsible for correct PT Provider scoring grades for acceptance limits not established by EPA or NELAC (should delete this standard from App. C.1.1 to Ch. 2)
- PTPA should not be responsible for reducing testing variables for Toxicity testing (should remove the PTPA from this requirement in App. F.1 to Ch. 2)

Recommendations for the NELAC PT Committee

- PTPA assessment reports should not necessarily tell PT Providers what corrective actions are necessary to fix deficiencies (should revise App. D.2.2(g) to NELAC Chapter 2)
- Need to revise the statistics used to evaluate PT homogeneity & stability
- Determine when PT Provider needs to do environmental analysis to confirm formulations

Statistical Considerations

- Homogeneity Testing acceptance criteria (App. B.3.1 and B.3.2 to Ch. 2)
- Stability Testing acceptance criteria (App. B.4 to Ch. 2)

How to Overwork Your PTOB/PTPA

- Make it review data from ALL PT Providers' studies (Ch. 2, App. A.7)
- Make it receive ALL written complaints to PT Providers & require satisfactory resolution (Ch. 2, App. A.8)
- Have it review sample formulation adequacy of EACH & ALL PT Providers' studies (Ch. 2, App. B.1)
- Make it deal with formulation testing & verification protocols from EACH PT Provider on a case-by-case basis, to establish sample equivalency (Ch. 2, App. B.1.1)
- Place upon it the burden of approving EACH PT Provider's homogeneity testing procedure to determine if it meets the standard (Ch. 2, App. B.3.2)

SAMPLE PREPARATION TECHNOLOGIES

Technology	Matrix	Procedure		Analyte or Method	Analyte Group	Codes	
		Sample Clean-up					
Clean-up	Extracts	Acid-base partition cleanup	EPA 3650B	SVOA	10	10	11
Clean-up	Extracts	Alumina cleanup	EPA 3610B	SVOA	10	10	12
Clean-up	Extracts	Alumina cleanup and separation	EPA 3611B	SVOA	10	10	13
Clean-up	Extracts	Florisil cleanup	EPA 3620B	SVOA	10	10	14
Clean-up	Extracts	Gel permeation cleanup	EPA 3640A	SVOA	10	10	15
Clean-up	Extracts	Silica gel cleanup	EPA 3630C	SVOA	10	10	16
Clean-up	Extracts	Sulfur cleanup	EPA 3660B	SVOA	10	10	17
Clean-up	Extracts	Sulfuric acid/permanganate clean-up	EPA 3665A	PCB	10	10	18
		Desorption					
Desorption	Solid/Chemical Materials	Analysis for desorption of sorbent cartridges from VOA sampling train	EPA 5041A	VOA	15	15	11
		Digestion					
Digestion	Non-potable Water	Hot plate acid digestion (HNO3 + HCl) for FLAA or ICP	EPA 3010A=SM 3030F	Metals	20	20	11
Digestion	Non-potable Water	Hot plate acid digestion (HNO3 + HCl) for FLAA or ICP	EPA 200.2	Metals	20	20	12
Digestion	Non-potable Water	Hot plate acid digestion (HNO3 only) for GFAA	EPA 3020A=SM 3030E	Metals	20	20	13
Digestion	Non-potable Water	Microwave digestion for FLAA, GFAA, ICP, or ICP/MS	EPA 3015=SM 3030K	Metals	20	20	14
Digestion	Non-potable Water	Nitric acid - perchloric acid - hydrofluoric acid digestion	SM 3030I	Metals	20	20	15
Digestion	Non-potable Water	Nitric acid - perchloric acid digestion	SM 3030H	Metals	20	20	16
Digestion	Non-potable Water	Nitric acid-sulfuric acid digestion	SM 3030G	Metals	20	20	17
Digestion	Non-potable Water	Preconcentration under acid for FLAA or ICP	EPA 3005A=SM 3030F	Metals	20	20	18
Digestion	Non-potable Water	Preparation for acid soluble metals (HNO3 only or HNO3/HCl) for FLAA, ICP, or ICP/MS	EPA 200.1	Metals	20	20	19

Digestion	Non-potable Water	Treatment for acid-extractable metals	SM 3030C	Metals	20	20	20
Digestion	Potable Water	Hot plate acid digestion (HNO3 + HCl) for FLAA or ICP	EPA 200.2	Metals	20	25	11
Digestion	Solid/Chemical Materials	Acid digestion for FLAA, ICP, GFAA, or ICP/MS	EPA 3050B = SM 3030 E&F	Metals	20	15	11
Digestion	Solid/Chemical Materials	Alkaline digestion for Cr(VI)	EPA 3060A	Metals	20	15	12
Digestion	Solid/Chemical Materials	Bomp preparation methods for chlorine by IC or titration	EPA 5050	Inorganics	20	15	13
Digestion	Solid/Chemical Materials	Hot plate acid digestion (HNO3 + HCl) for FLAA or ICP	EPA 200.2	Metals	20	15	14
Digestion	Solid/Chemical Materials	Microwave digestion (HNO3 only) for FLAA, CVAAS, GFAAS, ICP, or ICP/MS	EPA 3051	Metals	20	15	15
Digestion	Solid/Chemical Materials	Microwave digestion (HNO3 only) for FLAA, CVAAS, GFAAS, ICP, or ICP/MS	EPA 3052	Metals	20	15	16
Digestion	Solid/Chemical Materials	Permanganate digestion of oils for FLAA or ICP	EPA 3031	Metals	20	15	17
		Dilution					
Dilution	Solid/Chemical Materials	Dissolution of oils, greases and waxes with organics solvent for AAS or ICP	EPA 3040A	Metals	25	15	11
Dilution	Solid/Chemical Materials	Waste dilution	EPA 3580A	SVOA	25	15	12
Dilution	Solid/Chemical Materials	Waste dilution for VOA	EPA 3585	SVOA	25	15	13
		Distillation					
Distillation	Air	Volatile organic compounds by vacuum distillation	EPA 5032	VOA	30	30	11
Distillation	Non-potable Water	Volatile, nonpurgeable, water-soluble compounds by azeotropic distillation	EPA 5031	VOA	30	20	11
Distillation	Non-potable Water	Ammonia distillation	SM 4500-NH3-B	Inorganics	30	20	12
Distillation	Non-potable Water	Cyanide distillation	SM 4500-CN-C	Inorganics	30	20	13
Distillation	Non-potable Water	Phenol	SM 5530-B	Phenolics	30	20	14
		Extraction					
Extraction	Non-potable Water	Continuous liquid-liquid extraction	EPA 3520C	SVOA	35	20	11
Extraction	Non-potable Water	Hexadecane extraction and screening of purgeable organics	EPA 3820	VOA	35	20	12
Extraction	Non-potable Water	Organic extraction and sample preparation - method selection	EPA 3500B	SVOA	35	20	13
Extraction	Non-potable Water	Separatory funnel liquid-liquid extraction	EPA 3510C	SVOA	35	20	14
Extraction	Non-potable Water	Solid phase extraction	EPA 3535	SVOA	35	20	15
Extraction	Solid/Chemical Materials	Automated soxhlet extraction	EPA 3541	SVOA	35	15	11
Extraction	Solid/Chemical Materials	Cyanide extraction procedures	EPA 9013	Inorganics	35	15	12
Extraction	Solid/Chemical Materials	EP-TOX extraction	EPA 1310A	Metals,	35	15	13

				VOA, SVOA			
Extraction	Solid/Chemical Materials	Extraction of SVOA; samples collected by Method 0010 for GC/MS, HPLC, or HPLC/MS	EPA 3542	SVOA	35	15	14
Extraction	Solid/Chemical Materials	Hexadecane extraction and screening of purgeable organics	EPA 3820	VOA	35	15	15
Extraction	Solid/Chemical Materials	Mobile metal concentration of oily wastes	EPA 1330A	Metals	35	15	16
Extraction	Solid/Chemical Materials	Multiple extraction procedure	EPA 1320	Metals, VOA, SVOA	35	15	17
Extraction	Solid/Chemical Materials	Pressurized fluid extraction	EPA 3545	SVOA	35	15	18
Extraction	Solid/Chemical Materials	Soxhlet extraction	EPA 3540C	SVOA	35	15	19
Extraction	Solid/Chemical Materials	Supercritical fluid extraction of polunuclear aromatic hydrocarbons	EPA 3561	SVOA	35	15	20
Extraction	Solid/Chemical Materials	Supercritical fluid extraction of total recoverable petroleum hydrocarbons	EPA 3560	SVOA	35	15	21
Extraction	Solid/Chemical Materials	Synthetic Precipitation Leaching Procedure	EPA 1312	Metals, VOA, SVOA	35	15	22
Extraction	Solid/Chemical Materials	Thermal extraction for PCBs and PAHs by GC/MS	EPA 8285A	SVOA	35	15	23
Extraction	Solid/Chemical Materials	Toxicity Characterization Leaching Procedure (TCLP)	EPA 1311	Metals, VOA, SVOA	35	15	24
Extraction	Solid/Chemical Materials	Ultrasonic extraction	EPA 3550B	SVOA	35	15	25
		Filtration					
Filtration	Non-potable Water	Filtration for dissolved and suspended metals	SM 3030B	Metals	40	20	11
		Headspace					
Headspace	Non-potable Water	Headspace	EPA 3810	VOA	45	20	11
Headspace	Solid/Chemical Materials	Headspace	EPA 3810	VOA	45	15	11
Headspace	Solid/Chemical Materials	VOA compounds using equilibrium headspace analysis	EPA 5021	VOA	45	15	12
		Purge & Trap					
Purge & Trap	Non-potable Water	Purge and trap	EPA 5030B	VOA	50	20	11
Purge & Trap	Solid/Chemical Materials	Closed system purge and trap	EPA 5035	VOA	50	15	11
Purge & Trap	Solid/Chemical Materials	Purge and trap	EPA 5030B	VOA	50	15	12

Code Key

1st two digits - Preparatiuon technology (extraction, digestion, etc)

2nd two digits - matrix (extracts, potable water, etc)

3rd two digits - Variation of prep method (Silica gel clean-up, Florisil clean-up, etc)

TECHNOLOGY CODES

Tech Type	Technology Key	Description	Codes		
		Atomic Spectrometry & Inorganic Mass Spectrometry			
AS	CVAAS	Atomic Absorption - Cold Vapor Spectrometry	10	10	10
AS	FAAS	Atomic Absorption - Flame Spectrometry	10	10	15
AS	GFAAS	Atomic Absorption - Graphite Furnace Spectrometry	10	10	20
AS	HGAAS	Atomic Absorption - Hydride Generation Spectrometry	10	10	25
AS	DCP-AES	Atomic Emission - Direct Currrent Plasma Spectrometry	10	15	10
AS	FAES	Atomic Emission - Flame Spectrometry	10	15	15
AS	ICP-MS	Mass Spectrometry - Inductively Coupled Plasma	10	20	10
AS	ICP-AES	Atomic Emission - Inductvely Coupled Plasma Spectrometry	10	20	15
		Gas Chromatography			
GC	GC-MS	Gas Chromatography - Mass Spectrometry	15	10	10
GC	GC-HRMS	Gas Chromatography - Mass Spectrometry - High Resolution	15	10	15
GC	GC-ELCD	Gas Chromatography - Electrolytic Conductivity Detection	15	15	10
GC	GC-ECD	Gas Chromatography - Electron Capture Detection	15	20	10
GC	GC-FID	Gas Chromatography - Flame Ionization Detection	15	25	10
GC	GC-FTIR	Gas Chromatography - Fourier Transform Infrared Spectrometry	15	30	10
GC	GC-NPD	Gas Chromatography - Nitrogen/phosphorus Detection	15	35	10
GC	GC-PID	Gas Chromatography - Photoionization Detection	15	40	10
		Gravimetry			
Grav	GRAV	Gravimetry	20	10	10
		Liquid Chromatography			
LC	HPLC-PBMS	High Performance Liquid Chromatography - Mass Spectrometry - Particle Beam	25	10	10
LC	HPLC-TSMS	High Performance Liquid Chromatography - Mass Spectrometry - Thermospray	25	10	11
LC	HPLC-EC	High Performance Liquid Chromatography - Electrochemical	25	10	15
LC	HPLC-UV	High Performance Liquid Chromatography - Ultraviolet/visible Molecular Absorption	25	10	20
LC	HPLC-FLUOR	High Performance Liquid Chromatography - Ultraviolet/visible Molecular Fluorescence	25	10	25
LC	IC	Ion Chromatography	25	15	10
		Electrochemistry			
EC	DPP	Differential Pulse Polarography	30	10	10
EC	POL	Polarographic Probe	30	15	10

EC	AMP	Amperometric Titration	30	20	10
EC	ASV	Anodic Stripping Voltammetry	30	25	10
DP	COND	Conductance	35	10	10
DP	GALV	Galvanic Probe	35	15	10
DP	POT	Potentiometry	35	20	10
DP	COUL	Coulometric Titration	35	20	15
		Molecular Spectrometry			
UV/Vis/IR	COLOR	Ultraviolet or Visible Molecular Absorption Spectrometry	40	10	10
UV/Vis/IR	FLUOR	Ultraviolet or Visible Molecular Fluorescence Spectrometry	40	15	10
UV/Vis/IR	IR	Infrared Spectrmetry	40	20	10
		Radioanalytical Technology			
RA	GS-HR	Gamma Spectrometry - High Resolution	45	10	10
RA	GS-LR	Gamma Spectrometry - Low resolution	45	10	15
RA	SC	Scintillation Counting	45	15	10
RA	SC-L	Liquid Scintillation Counting	45	15	15
RA	PC	Proportional Counting	45	20	10
RA	AS	Alpha Spectrometry	45	25	10
		X-Ray Technology			
XR	XRF	X-Ray Fluorescence Spectrometry	50	10	10
XR	XRT	X-Ray Transmission Spectrometry	50	15	10
		Microscopic Technology			
Micros	EM-T	Electron Microscopy - Transmission	55	10	10
Micros	EM-S	Electron Microscopy - Scanning	55	10	15
Micros	PLM	Polarized Light Microscopy	55	15	10
		Titrimetry - Visual Indicator			
TITR	TITR	Visual Indicator	65	10	10
		Microbacteriology	70	10	10
		Miscellaneous			
Misc	NA	Neutron Activation	75	10	10

Code Key

1st two digits - Technology type (Gas Chromatography, Electrochemistry, etc)
2nd two digits - Variations of primary technology type (MS, FID, ECD, etc)
3rd two digits - Variations of secondary technology (cold vapor, graphite furnace, flame, etc)